

THE MINERAL INDUSTRY OF

NAMIBIA

By George J. Coakley

Namibia is located on the southwestern coast of Africa between South Africa and Angola. The 825,418-square-kilometer country had an estimated population of 1.9 million in 2002 and a gross domestic product (GDP) per capita based on purchasing power parity of about \$6,900.¹ The GDP growth rate in real terms was 2.3% for the year, and inflation at 11% was at its highest level since 1992 owing to food shortages and the weakening Rand. In 2002, the mineral industry of Namibia, which employed more than 6,600 workers, provided about 68% of exports and 20% of the country's GDP. Namibia had a trade deficit of \$173 million in 2002. Total merchandise exports were valued at \$1,079 million, of which diamond accounted for \$535.8 million, and other mineral commodities, chiefly uranium, for \$201.3 million. Total merchandise imports were valued at \$1,252 million, of which fuel and energy products accounted for less than 10%. Diamond remained the most important sector of the mining industry followed by uranium, for which Namibia ranked as the world's sixth largest producer. The opening of the Skorpion zinc operation in 2002 was an important addition to the minerals sector. Namibia was also the second largest producer of salt in Africa. Other important mineral products included copper, dimension stone (granite and marble), fluorite, gold, lead, silver, and zinc (Bank of Namibia, 2003a§;² Central Intelligence Agency, 2003§; International Monetary Fund, 2003§).

Commodity Review

Metals

Copper.—Ongopolo Mining and Processing Limited, which was a partnership between the former managers of Tsumeb Copper Limited (TCL) and the National Union of Namibian Workers (NUMW), continued operations of the Tsumeb copper smelter and the Khusib Springs, Kombat, and Otjihase copper-lead-silver mines during 2002. According to the Chamber of Mines of Namibia (2003, p. 9-10), Ongopolo increased mine-mill production to 63,997 metric tons (t) of copper concentrates that contained 18,012 t of copper metal, compared with 31,803 t of concentrates, that contained 12,393 t of copper during 2001. About 60% of the concentrate output came from Otjihase. Production of blister copper at the Tsumeb smelter, which included production from imported toll concentrates, declined by 34% to 17,850 t from 27,015 t, and yielded 17,567 t of copper metal, 12.02 t of silver, and 165 kilograms (kg) of gold. Completion of a planned road bridge to Zambia would make additional toll copper concentrates available to the Tsumeb smelter. Ongopolo had the following development projects underway, all of which were aimed at expanding production: construction of the Asis Far West Appraisal Shaft, which was designed to give access to possible reserves of 30 million metric tons (Mt) at the Kombat Mine; completion of the renovation of the Tsumeb concentrator, which will treat ore from the Tschudi, Tsumeb Upper Levels, and Tsumeb West mines; development work aimed at bringing the Tsumeb West Mine into production by late 2003; and a feasibility study on the viability of retreating old tailings. In addition, the joint venture between Ongopolo and ZincOx Resources Plc of the United Kingdom was expected to complete a feasibility study by yearend 2004 that would evaluate the potential for using the existing Ausmelt furnace at Tsumeb to extract germanium from the old Tsumeb slag dumps by reducing the slag to a zinc-rich, germanium-bearing oxide dust (Chamber of Mines of Namibia, 2003, p. 10).

Lead and Zinc.—Namzinc (Pty.) Ltd., which was owned 100% by Anglo American plc, was developing the \$454 million Skorpion zinc mine and refinery project approximately 85 kilometers (km) northeast of Oranjemund and 25 km north of Rosh Pinah. A brief, but violent strike action in August 2002 delayed completion of construction during 2002; consequently, first metal production was rescheduled for May 2003. When completed, Skorpion will be the largest zinc solvent extraction operation in the world and will produce 150,000 metric tons per year (t/yr) of special high-grade zinc during a mine life of at least 15 years.

Rosh Pinah Zinc Corporation (Pty.) Ltd., which was owned by Kumba Resources of South Africa, operated the Rosh Pinah zinc mine. Concentrates were sent to Kumba's Zincor refinery in South Africa for treatment. During 2002, Rosh Pinah produced 77,587 t of zinc concentrates that contained 41,012 t of zinc, 1,381 t of lead, and 6.9 t of silver and 24,140 t of lead concentrates that contained 11,809 t of lead, 1,673 t of zinc, and 16.67 t of silver (Chamber of Mines of Namibia, 2003, p. 5).

Gold.—AngloGold (Namibia) Pty. Ltd. held a 100% interest in the Navachab gold mine near Karibib. Navachab had the capacity to treat 1.32 million metric tons per year (Mt/yr) of ore. Production in 2002 was 2,644 kilograms (kg) compared with 2,706 kg in 2001. The decrease was attributed to a lower yield of gold of 1.93 grams per metric ton (g/t) from 2.04 g/t in 2001. As of yearend 2001, mineral reserves were reported to be 4.5 Mt at a grade of 1.65 g/t gold, and mineral resources, 81.6 Mt at a grade of 1.06 g/t

¹ Where necessary, values have been converted from Namibian dollars (N\$) to U.S. dollars at the rate of N\$10.46=US\$1.00 for 2002 and N\$8.496=US\$1.00 for 2001.

² References that include a section mark (§) are found in the Internet References Cited section.

gold. In July 2002, AngloGold made the decision to proceed with a pushback towards the east to extend the life of the mine by 8 years to 2013. The Government approved the company's early application for the renewal of the mining license, thus extending the license to 2018 (AngloGold Limited, 2003§).

Silicon.—Namibia Metals had proposed building a \$50 million silicon metals plant at Omaruru in 2000 but faced problems arranging financing, and the Ministry of Mines and Energy threatened to withdraw its mineral rights to the quartz deposit at Omaruru. Details on developments of this project during 2002 were not reported.

Tin-Tantalite.—During 2002, a small tantalite mine was opened by the Albaca Mining Company [a subsidiary of Central African Mining and Exploration Co. Plc. (CAMEC)] of London. The Three Aloes Mine, which is located 10 km south of Uis, was operating at a rate of 1.5 metric tons per month (t/mo) of tantalite concentrate and was capable of increasing production to 3 t/mo of tantalite concentrate. CAMEC also was buying concentrates from local artisanal miners who were producing about 400 kilograms per month of salable concentrate. CAMEC also held interests in the Falcon, Strathmore, and Goantagab tin-tantalite prospects. It had outlined 1.5 Mt of pegmatitic material at Falcon and was planning to begin mining in 2003 at a rate of 40 metric tons per hour to yield 7 t/mo of tantalite concentrate at 36% tantalite and 6 t/mo of tin concentrates at 60% cassiterite (Tassel, 2003b).

Uranium.—Rössing Uranium Ltd., which was owned by Rio Tinto plc of the United Kingdom (68.6%), was the fifth largest producing uranium mine in the world, and contributed 2,751 t of uranium oxide in 2002. Production increased by 4% in 2002 compared with that of 2001 despite a drop in ore processed to 8.77 Mt from 9.08 Mt. One of the largest open pit mines in the world, Rössing moved more than 25 Mt/yr of ore and waste material. It reported reserves in 2002 sufficient to maintain the mine life for an additional 16 years. Rössing was constructing a new haulage and pit area ramp on the northern wall of the existing pit following concerns over the stability of the southern wall because of the major fault that runs through it. The company also was investigating the possibility of constructing a new ore-sorting pilot plant and an overland conveyor to replace a tailings pumping system (Chamber of Mines of Namibia, 2003; Rössing Uranium Ltd., 2003§).

Industrial Minerals

Diamond.—Diamond accounted for about 50% of total exports in 2002, and production of diamond increased by 3% to 1,549,599 carats; slightly more than one-half came from marine sources. Namdeb Diamond Corp. (Pty.) Ltd. (Namdeb), which had been established in 1994 as a 50-50 joint venture between De Beers Centenary AG and the Namibian Government, was the largest diamond producer. Namdeb treated 28.1 Mt of material with an average grade of 4.5 carats per 100 metric tons, to yield 1,276,000 carats with an average size of 0.58 carats; 40% came from offshore marine mining. Production came from four onshore and one marine operations—Diamond Area 1; the Orange River mines (58,548 carats); the Elizabeth Bay Mine; beach and marine contractors, many of whom were Namibian empowerment groups (65,932 carats); and marine mining operations in the Atlantic 1 license area conducted by De Beers Marine Namibia (Debmarmine) (513,053 carats). Debmarine, which was owned by De Beers (70%) and Namdeb (30%), maintained a fleet of four mining and two prospecting vessels. The new Daberas Mine along the Orange River was commissioned in May 2002, and processing plants within Diamond Area 1 were upgraded. As land resources become depleted, Namdeb expected to expand its marine diamond operations [Chamber of Mines of Namibia, 2003, p. 6-8; Namdeb Diamond Corp. (Pty.) Ltd., 2003§].

Namibian Minerals Corp. (Namco), which was a United Kingdom-based firm listed on the Toronto and Namibian stock exchanges, mined diamond from its offshore Koichab prospect in Luderitz Bay. It owned three former Ocean Diamond Mining airlift mining vessels, the *Ivan Prinsep*, the *MV Namibian Gem*, and the *Oceandia*, and two mining vessels, the *MV Kovambo* and the *MV Ya Toivo*. These mining vessels supported the Namco-developed underwater NamSSol I and NamSSol II (Nam 2) seabed mine crawlers that had a combined capacity of around 400,000 carats per year. Namco, which was the second largest diamond producer after Namdeb, struggled to continue operations during 2001 after its NamSSol I mining tool was damaged in an underwater landslide in January 2001 and *MV Kovambo* was placed on care and maintenance. With financial assistance from LL Mining Corp., which was a member of the Leviev Group of Israel, Namco was able to keep two of its mining vessels operational and increased production dramatically to 235,616 carats compared with 85,592 carats in 2001. Faced with increasing financial problems, Namco ceased operations at the end of November 2002, and its debtors prepared to liquidate Namco assets in 2003 (Chamber of Mines of Namibia, 2003).

Diamond Fields International Ltd. (DFI) of Canada began mining operations at its Marshall Fork and Diaz 12 marine deposits with its joint venture partner Trans Hex Group Ltd in May 2001. DFI contributed the mining license, and Trans Hex, two air-lift mining vessels to the joint venture. In July 2002, however, Trans Hex unilaterally withdrew its support and mining vessels from the joint venture. Subsequent litigation, which was resolved in December 2002, yielded a net gain of more than \$400,000 for DFI. Diamond mining was restarted by DFI in November 2002, but suspended in March 2003 to facilitate the change of ownership and renovation of *MV Anya*. Production was to resume in September 2003. For the financial year that ended June 30, 2003, DFI sold 14,727 carats valued at \$1,892,802 for an average of \$142.65 per carat. Recovery from the Marshall Fork concession was at a rate of 2.45 carats per square meter, which was much higher than the 1.01 carats predicted in the project feasibility study. Production from the Marshall Fork area for calendar year 2002 was 25,401 carats compared with 16,470 carats in calendar year 2001 (Diamond Fields International Ltd., 2003§).

Diaz Exploration (Pty.) Ltd. reported production of 25,000 carats from offshore operations compared with 12,000 carats in 2001. Other companies active in diamond exploration during 2002 included the Australian companies Mount Burgess Gold Mining Co. NL and Kimberlite Resources Pty. Ltd., which continued their geophysical and heavy mineral concentrate sampling exploration for

diamond-bearing source rock kimberlites in the Tsumkwe region in northeastern Namibia near the Botswana border. Mount Burgess announced discovery of the Gura 1 kimberlite in December 2001 and the Nxa kimberlite in June 2002 and was to continue exploration in the area during 2003 (Mount Burgess Gold Mining Co. NL, 2003§). Reefion Mining NL of Australia also held three exploration licenses for diamond that covered 200 km of coastline beaches along the Skeleton Coast. During 2001, Afri-Can Marine Minerals Corp. of Canada increased its holdings in the Block J (Woduna concession), which was located north of Hottentot Bay, to a 70% interest and contracted the mining vessel *MV Lady S* from Gemfarm Investments (Pty.) Ltd. to follow up on its successful sampling program in 2003. The *MV Lady S* had two airlift sampling pumps and a 50-metric-ton-per-hour dense medium separation plant on board (Afri-Can Marine Minerals Corp., 2003§).

Fluorspar.—The Okorusu Mine was operated as a captive mine by Okorusu Fluorspar (Pty.) Ltd. to supply fluorspar to its parent company Solvay AG of Germany. The Okorusu Mine is located about 60 km north of Otjiwarango. Following completion of its major expansion project in 2000, production increased to about 81,000 t/yr of fluorspar in 2001 and 2002. An upgraded mining truck fleet and new milling and flotation facilities were expected to allow production levels to increase to 95,000 t/yr of acid-grade fluorspar in 2003 and 100,000 t/yr in 2004. The processing flow sheet has been custom designed to handle the complex mineralogy of the carbonatite-hosted fluorite deposits at Okorusu. The company continued exploration to define the resource potential at its Okorusu Mine and planned to complete a feasibility study on the development of the Omburu fluorspar prospect, which is located 30 km east of Omaruru in the Erongo region. Reserves were sufficient to maintain production at 100,000 t/yr of concentrate for 15 years. Ore was trucked from the mine 20 km to a rail siding and then transported by rail to Walvis Bay for export (Tassel, 2003a).

Mineral Fuels

Namibia, which has no domestic production of coal, gas, or oil, was import dependent for most of its energy needs. The hydroelectric dam at Ruacana provided 249 megawatts (MW) of power, and an additional 600 MW was imported from South Africa under arrangements with Eskom and the South African Power Pool. The country's hopes for meeting future energy requirements rested on the development of its hydroelectric potential and of its extensive known offshore gas reserves. Shell Exploration and Production Namibia B.V. (75%), ChevronTexaco Corp. (12.5%), and Energy Africa Ltd. (12.5%) held the rights to the offshore Kudu gasfield. The Government and Shell had been examining the potential for developing this resource for more than 7 years, but were unable to work out the right combination of financing and supporting projects to justify the multibillion-dollar investment required for its development. In September 2002, Shell announced that it was pulling out of Namibia's offshore Kudu gas project. As reported by the U.S. Energy Information Administration (2003§), "the decision was made after the failure to find sufficient reserves to build an offshore LNG export facility. Kudu's reserves are estimated at 36.8 billion cubic meters, well short of the 142 billion cubic meters needed for the proposed \$2.5 billion floating LNG facility. ChevronTexaco and Energy Africa, which were the remaining partners, said that reserves were sufficient to develop gas-fired power schemes that use Kudu gas. The Cape Power Project would include a 1,200 to 2,000-MW combined-cycle, gas-turbine power station near Cape Town. The powerplant would serve the metropolitan area and industrial plants at Saldanha Bay. The plan also would include a 400-MW powerplant at Oranjemund, Namibia, that will supply Namibia and western South Africa with electricity."

Outlook

The long tradition of mining in Namibia is being substantially renewed with the reopening of the Tsumeb mines and smelter in 2000, the planned opening of the new Skorpion zinc project in 2003, and the continued success of offshore diamond exploration and development. These successes are encouraging further exploration for base metals and diamond. Although offshore diamond production experienced some setbacks during 2001 and 2002, owing to technical or business reasons, the diamond resource potential remains strong. These new mine developments, along with the potential for new value-added manufacturing, metal-processing, and gemstone-cutting and gemstone-polishing industries, should keep the minerals sector a central part of the economy of Namibia for the foreseeable future. The Government's ability to attract new investment to harness offshore natural gas resources and the hydroelectric power potential of the Kunene River will strongly influence future economic growth. In the longer run, greater development of the regional transportation infrastructure in northern Namibia, which has already been stimulated by the completion of the Trans Kalahari and Trans Caprivi Highways, could see Walvis Bay become a significant export route for new mineral developments in Angola and Congo-(Kinshasa) and in the landlocked countries of Botswana and Zambia. With a climate that is among the driest in the world, Namibia will continue to deal with the scarcity of water resources as a constraint on development.

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Major Sources of Information

Association of Prospectors and Miners of Namibia

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Government of Namibia

Internet: <http://www.republicofnamibia.com>

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Ministry of Trade and Industry

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Namibia National Small Miners Association

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Major Publications

Chamber of Mines of Namibia, Annual Report.

Geological Survey of Namibia, 1992. The Mineral Resources of Namibia, 598 p.

TABLE 1
NAMIBIA: PRODUCTION OF MINERAL COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity	1998	1999	2000	2001	2002
METALS					
Arsenic, white, 99% arsenic trioxide	175	--	--	914	880
Copper:					
Mine output, concentrate (26% - 30% Cu):					
Gross weigh	22,819	--	19,099	53,790 ^r	63,997
Cu content	7,500	--	5,620	12,393 ^r	18,012
Metal, blister ²					
From domestic concentrates	8,014		5,082	18,386 ^r	17,850
From imported toll concentrates				8,629 ^r	8,853
Total	8,014	--	5,082	27,015 ^r	26,703
Gold kilograms	1,882	2,005	2,417	2,706 ^r	2,644
Lead:					
Mine output, concentrate:					
Gross weight	24,273	18,653	20,665	25,565 ^r	24,140
Pb content of Pb and Zn concentrates	13,568	9,885	11,114	12,088 ^r	13,809
Metal, refined, primary ²	236	--	--	--	--
Silver:					
Mine output, Ag content of concentrate kilograms	22,670	9,670	9,287	20,396 ^r	43,632
Metal, refined, primary ² kilograms	16,680	--	8,790	18,150	12,020
Uranium, U ₃ O ₈	3,257	3,171	3,201	2,640	2,751
Zinc, mine output, concentrate (49% - 54% Zn):					
Gross weight	78,617	70,620	73,535	70,923 ^r	77,587
Zn content of Zn and Pb concentrates	42,274	35,140	39,126	37,622 ^r	42,685
Metal, refined, primary ²	--	--	--	--	35
INDUSTRIAL MINERALS					
Cement ^e	150,000	150,000	--	--	--
Diamond:					
Gem ^e thousand carats	1,394 ^e	1,633	1,552	1,487 ^r	1,562
Industrial ^e do.	73 ^e	--	--	--	--
Total do.	1,467	1,633	1,542	1,487	1,562
Fluorspar, acid grade (97% CaF ₂) ³	42,139	71,011	66,128	81,551 ^r	81,084
Gypsum	2,596	1,250	588	--	--
Salt	507,361	502,770 ^r	523,009 ^r	543,218	411,852
Semiprecious stones:					
Agate	161	95	96	138 ^r	190
Amethyst kilograms	--	--	4,850	4,500 ^{r,e}	4,500 ^e
Chrysocolla do.	900	--	--	2,685	13
Garnet do.	429	--	134	150 ^{r,e}	150 ^e
Quartz, crystal ^e	--	--	--	-- ^e	-- ^e
Pietersite	--	--	20	5,370 ^r	--
Rose quartz	454	--	74	30 ^r	--
Sodalite	--	429	457	46 ^r	1,691
Tourmaline kilograms	--	--	390	--	--
Stone:					
Dolomite	7,940	8,000 ^e	--	19,593 ^r	--
Granite	6,665	5,866	7,222	5,723 ^r	24,754
Marble	9,020	11,221 ^e	24,426	18,337 ^r	3,182
Sulfur, pyrite concentrate:					
Gross weight (49% - 51% S)	28,174	--	11,967	68,674 ^r	3,633
S content	12,855	--	5,704	34,491 ^r	1,874
Wollastonite	267	347	441	284 ^{r,e}	742

^e Estimated. ^r Revised. -- Zero.

¹Table includes data available through November 30, 2003.

²Includes products of imported concentrate.

³Fluorspar production shown in wet metric tons; approximately 9% moisture.

Sources: The Chamber of Mines of Namibia Annual Reports, 1998-2002, and Namibia Ministry of Mines and Energy response to U.S. Geological Survey Minerals Questionnaire, 2001-2002.